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MNR sets new strategic direction

Supporting *Our Sustainable Future* through forest research

By Lisa J. Buse and Abigail M. Obenchain

Wayne Fiset, the new manager for Forest Research and Development Section (FRDS) at OFRI, was excited to see MNR release *Our Sustainable Future*, the new strategic direction document that outlines how MNR will work towards ecological sustainability over the next five years. "Much of our current research fits nicely within this framework," Fiset says. "Research and science play a strong supporting role in maintaining forest sustainability."

Announced in February 2005, *Our Sustainable Future* outlines specific short- and long-term strategies for each goal (see sidebar on Page 3) and proposed supporting actions. All parts of MNR are contributing to ensuring that the strategies and actions in *Our Sustainable Future* occur: "Since our mandate is to conduct applied forest research in support of sustainable forest management, most of our efforts support the goal of **maintaining a healthy natural environment for Ontarians,**" Fiset says. Some examples:

Protecting species at risk – For the past 10 years, research led by Wayne Bell has been documenting the effects of forest management activities on plant species abundance and distribution. In addition to helping document the occurrence of rare species, this work has shown that early successional forests are much

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Photo: Monique Wester

Forest researchers led by Wayne Bell have spent a decade documenting how forest management activities affect biodiversity.

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more diverse than mature forests and that most species affected by forest management treatments recover rapidly following disturbance.

Protecting trees from diseases – Research led by John McLaughlin is determining where to plant various tree species to minimize disease-related timber losses, particularly where intensive silviculture is used.

Mitigating impacts and/or adapting to climate change – For the past three years, researchers led by Steve Colombo and Michael Ter-Mikaelian have been developing models to calculate Ontario's carbon budgets in support of Kyoto protocol commitments. Their next step is to model how climate change will affect wood supply and interact with increased use of intensive forest management practices. Research led by Tom Noland is focused on the use of protein markers to select black spruce that are less susceptible to drought; results may help resource managers ensure that their tree crops survive and grow despite future climate change.

Reviewing guidelines – Forest management guides are the foundation for forest management planning in Ontario. Many forest researchers at OFRI contribute to guide development. For example, boreal mixedwood researchers helped develop MNR's recently released *Silviculture Guide to Managing Spruce, Fir, Birch, and Aspen Mixedwoods in Ontario's Boreal Forest.* Staff also review and help revise existing guides, for example, the silvicultural guides for the boreal and Great Lakes-St. Lawrence forests. In addition, researchers led by Ajith Perera are modelling natural forest landscape dynamics to support a new landscape guide being developed by MNR's Forest Management Branch and to assess the effectiveness of the directions in MNR's *Forest Management Guide for Natural Disturbance Pattern Emulation.*

Protecting and managing water resources – Research led by Jim McLaughlin is determining the effects of forest management practices on soil and water resources and helping to ensure that forest management practices minimize effects on forested watersheds. Research led by Bill Cole is investigating how removing coarse wood (logs) from lake shorelines affects fish and other components of riparian zone ecosystems.

Photo: FRDS Soils and Water Program

Research scientist Jim McLaughlin collects a water sample near White River for a study on how forest harvesting affects water quality.

"Our research also supports the goal of **promoting economic growth,**" Fiset continues. "For example, some of our researchers are involved in assessing the feasibility and identifying the potential environmental effects of proposed cogeneration and biofuels facilities being established under Ontario's Green Energy program. Others are investigating Canada yew as a potential crop species for northern Ontario farmers (see related article in *Insights* Vol. 6, No. 2). In addition, a stem profile model developed by Voyteck Zakrzewski is being used to estimate the proportion of sawlogs vs. pulp in the provincial wood harvest. This expertise is supporting Ontario's case in the softwood lumber trade dispute with the United States, the outcome of which has huge economic implications."

Forest research and transfer activities also support the goal of **supporting partnerships and community involvement,** for example:

Partnership strategy – In the mid-1990s, MNR's research and science units adopted a partnership model to share resources, expertise, risks, and successes. Over the past five years, FRDS researchers at OFRI have more than tripled their operating funds by leveraging from partners. Their partnership strategy includes engaging research partners through memoranda of understanding with colleges and universities to share students, resources, and expertise; being a member of national and international research organizations, such as the Sustainable Forest Management Network and the International Union of Forest Research Organizations; and working directly with forest industry, for example, through the Forestry Research Partnership (see related article on Page 7). "Partners not only help to fund research but also ensure that the research is relevant," Fiset says. "What's more, results get applied faster with partners directly involved in the research process."

Enhanced outreach – "One of the most important aspects of forest research is ensuring that the results

are put into practice," Fiset says. "Our staff are involved in a range of transfer activities, from presenting at workshops, conferences, and symposia to participating in tours to developing demonstration areas. In addition, research results and products are made available via the OFRI website, *Insights* newsletter, regular e-mail updates for clients and partners, local media coverage, and a seminar series."

Youth involvement – Research staff have always been proactive in mentoring students and prospective staff. They regularly supervise graduate students; host coop students from local high schools, colleges, and universities; provide training programs for interns; and employ summer experience students. Staff also provide regular tours for college and university forestry classes, Ontario Stewardship Rangers, and Ontario Rangers to expose them to MNR's forest research. As well, staff support local resource management-related events, such as the high school Envirothon and regional science fairs. This spring, OFRI provided workshops for grade 8 and 9 students as part of a regional Youth Science Forum organized by the Upper Lakes Environmental Research Network (ULERN), a frequent research partner.

Photo: Trudy Vaittinen

As part of the 2005 Youth Science Forum held in Sault Ste. Marie, research scientist Wayne Bell led students through a role-playing exercise designed to teach them how forest managers choose among vegetation management strategies, depending on various ecological, economic, and social factors.

As with all of MNR, FRDS strives to promote **organizational excellence** in various ways. For example, MNR is developing a coordinated strategy for all of its research and science efforts, and FRDS is developing a strategic plan as well. To be released in 2005, these strategies will be linked to the goals of *Our Sustainable Future* and will guide forest research efforts into the future.

More about *Our Sustainable Future*

Key goals and associated strategies outlined in MNR's 2005-2010 strategic directions document are:

1. Healthy natural environment for Ontarians
   - Conserve Ontario's biodiversity
   - Ensure sustainable forestry
   - Protect water sources
   - Enhance resource management in southern Ontario
   - Enhance quality of life for Ontarians through the use and enjoyment of natural resources
2. Economic growth for Ontario communities
   - Provide new ventures in renewable energy
   - Support improved Aboriginal relations through economic development opportunities and partnerships
   - Stimulate economic development and community stability in northern Ontario
   - Optimize economic benefits of Ontario's natural resources
   - Enhance market access and manage external influences
3. Public health and environmental safety to protect our citizens
   - Lead natural resource preventive and emergency management and support other agencies
   - Investigate and manage fish- and wildlife-borne diseases
4. Stewardship, partnerships and community involvement
   - Support effective partnerships and promote awareness through enhanced outreach
5. Organizational excellence for improved public service
   - Ensure MNR has a competent and diverse workforce
   - More efficient, transparent and accountable governance
   - Support decision-making and policy development

To download *Our Sustainable Future*, visit http://www.mnr.gov.on.ca.

PROFILE
Pengxin Lu

By Abigail M. Obenchain

You won't find a research scientist who is more upbeat about working at OFRI than Pengxin Lu, the institute's genetics and tree improvement expert. "I enjoy working at OFRI for many reasons," he says. "I like the friendly working environment, the long history of forest genetics and tree improvement programs in Ontario, the frequent research opportunities, the modern growth facilities, and the excellent support and services to research scientists, such as the technology transfer unit."

A five-year veteran of Forest Research and Development Section at OFRI, Lu reports that the high point for him thus far came in 2001: "I was extremely excited when my research proposal for Screening White Pine for Blister Rust Resistance was funded through MNR [watch for an article about this project in the next issue of *Insights*], as I knew this was a challenging but potentially very rewarding project, based on my understanding of the accumulated white pine blister rust research conducted by MNR research scientists beginning in the late 1940s. I felt very fortunate to be in a position to continue their work."

Photo: Trudy Vaittinen

Lu finds studying genetics and tree improvement for MNR satisfying because of the applied nature of the research. "The objective is to produce tangible results to gain ecological and socio-economic benefits for the people of Ontario," he says. "Forest genetics and tree improvement can contribute greatly to forest sustainability by enhancing forest health and productivity. For example, white pine blister rust, an invasive alien disease, has made it difficult for resource managers to regenerate white pine. During the past half a century, this disease has not been effectively controlled or significantly reduced by silvicultural measures. The associated decline in white pine abundance has affected its genetic diversity, wildlife habitat, and ecosystem integrity. If blister rust can be controlled using resistant white pine seedlings, many uncertainties about white pine sustainability can be reduced."

He adds that genetics and tree improvement researchers contribute to more than just disease prevention. "We also work on selecting trees that have genetic traits associated with benefits such as superior growth and the ability to adapt to stressors such as climate change."

Lu cautions that all tree improvement activities in Ontario are conducted using the traditional plant breeding approach, i.e., by allowing mating to happen in a natural way between selected individuals that have the desired genetic traits. "Trees modified through genetic engineering are not planted in Ontario."

In addition to the white pine blister rust resistance project, Lu has worked on:

- Investigating how well white pine grown from seed from various sources in eastern Ontario would grow if planted in other areas. Lu and his collaborators found that seed from more southerly and warmer areas grew faster; thus, moving a seed source one degree north in latitude could increase plantation height growth significantly in the first five years relative to using a local seed source. However, they also found that moving seed too far north could increase the risk of frost damage (see *Seed Source Selection of Eastern White Pine*, Forest Research Note No. 64).
- Developing efficient, effective, low-cost methods for propagating conifer seedlings vegetatively through rooted cuttings. Lu has successfully rooted and grown white pine cuttings, dramatically reducing the time and money needed to produce stock for the white pine blister rust resistance experiments (see *Insights* Vol. 6, No. 2).

As much as he enjoys his work, Lu reports that he didn't always want to be a geneticist. "I grew up in a village in northwest China in Shaanxi province, about 100 kilometres from the city of Xian. In high school, I learned very little about genetics or even biology, but I did well in math and physics and hoped to become an engineer or a mathematician."

Photo: Trudy Vaittinen

However, the results of his university entrance exams steered him instead to the Northwest Agricultural University in Yangling, China, where he was exposed to and fascinated by the work of Austrian genetics pioneer Gregor Mendel. He was one of the few in his university graduating class assigned to work at the Chinese Academy of Forestry in Beijing, where he became a research scientist working on genetics and tree improvement. In 1992, he moved to Canada to attend the University of Alberta, where he earned an M.Sc. in forest genetics two years later. In 1999, he received a Ph.D. in forest genetics from the University of Florida, and the following year, moved north to Sault Ste. Marie to work at OFRI.

Lu is married and has a teenaged son. In his spare time, he plays Chinese chess, as well as table tennis in the winter and outdoor tennis in the summer. He and his wife also relish looking after the garden they have set up on the balcony of their apartment.

You can reach Lu at (705)946-7415, pengxin.lu@mnr.gov.on.ca.

OFRI's laboratories:

Unlocking the chemical mysteries of Ontario's forests and trees

By Abigail M. Obenchain

While field researchers are out in the forest collecting data on how forests grow and change in response to human activities and natural disturbances, another dedicated group is toiling away quietly in the laboratories on the second floor of the OFRI building in Sault Ste. Marie.

"Labs play an important support role for forestry research," says Tom Noland, a tree biochemistry research scientist at OFRI. "Labwork provides information about how ecosystems and individual trees function and grow and how they are affected by stress, disturbance, or human activities. This information is critical for assessing and developing sustainable forest management practices."

The three analytical labs at OFRI focus on geochemistry, tree biochemistry, and forest pathology. So what happens in these labs, how do they support forest research, and who works in them?

1. Geochemical laboratory: Analyzing nutrients in earth and water

According to chemistry lab group leader Ravi Kanipayor, geochemical lab staff analyze the nutrient content of forest soils, water, and forest-floor leaf litter. "Some of the nutrients we analyze are aluminum, calcium, carbon, magnesium, nitrogen, phosphorus, potassium, and sodium," he says.

Several types of research projects require geochemical analyses. For example, this lab is contributing to silviculture research by helping scientists understand how silvicultural techniques alter each nutrient's levels and movement through the ecosystem, helping or hindering forest growth and health (for more information, see *Silviculture and Soils* project profile at http://ofri.mnr.gov.on.ca/ofriresearch.cfm).

Photo: Trudy Vaithinen

Lab technologist José Schroeder analyzes water samples for carbon content.

The lab is also supporting climate change research by analyzing the carbon content of soil samples in two boreal mixedwood watersheds to reveal how carbon is stored and cycles through riparian zone (lake and river shoreline) ecosystems. This information will help researchers to draw a more accurate picture of carbon cycling throughout Ontario's landscape, in support of Canada's Kyoto Protocol commitments (for more information see *Carbon Sink and Source Functions* project profile at http://ofri.mnr.gov.on.ca/ofriresearch.cfm).

When conducting their analyses, geochemical lab staff use a range of sophisticated instruments, with intriguing names like the Elementar VarioMAX Carbon and Nitrogen Analyzer and the Varian Liberty II Inductively Coupled Argon Plasma Spectrophotometer. "The latter instrument is extremely versatile," Kanipayor says. "It can analyze most of the elements in the periodic table, although our focus is mainly forest nutrients."

He adds, "People might be surprised to know the level to which we can detect these nutrients. Most of our analysis results are in parts per million or parts per billion. We even have an instrument that can analyze mercury in water at low parts per trillion.

"They might also be surprised at the amount of work involved in preparing samples for analysis. You can't just drop a cup of soil into an instrument. Essential preparatory steps like sieving, drying, and separating soil samples by particle size and then converting them into the required liquid form are very labour intensive and time consuming."

Occupying the relatively new position of lab group leader, Kanipayor is working on maximizing the lab's productivity and efficiency; developing and implementing

Photo: Trudy Vaithinen

Lab technologist John Perron prepares samples for nutrient analysis.

a quality assurance program; and getting the lab accredited by the Standards Council of Canada. This lab also has two technologists, John Perron and Darren Falcioni, with several other staff working on short-term contracts. Over the past year, they have processed more than 9,000 samples.

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The geochemical lab conducts analyses not just for the Forest Research and Development Section at OFRI but also for MNR's Centre for Northern Forest Ecosystem Research (CNFER), Ontario Terrestrial Assessment Program, and Wildlife Research and Development Section.

2. Tree biochemistry laboratory: Analyzing compounds in trees and other plants

The role of the biochemistry lab is to "conduct analyses of tree bark, wood, stems, roots, and needles to determine how the trees function biochemically in response to some treatment or environmental stress," reports tree biochemistry research scientist and lab supervisor Tom Noland. "For example, we analyze roots for starch content, maple sap for sugar content, and foliage for chlorophyll content or for soluble protein and sugars."

According to Noland, recent work has included analyzing root starch and maple sap sugar content as part of the ice damage research program, which showed that sugar maples with more than 50 percent crown damage had reduced root starch levels, indicating physiological stress and reduced syrup production. In addition, lab staff have been separating and analyzing proteins in black spruce foliage using a technique called *two-dimensional gel electrophoresis*, hoping that these proteins can be used as markers to identify families of trees that can tolerate heat and drought stress caused by climate change. This lab is also involved in a project to look at farming Canada yew so the chemical paclitaxel can be extracted from its foliage and used to produce Taxol®, an important cancer drug (for more details on all three projects, see *Insights* Vol. 6, No. 2 or the project profiles at http://ofri.mnr.gov.on.ca/ofriresearch.cfm).

"Our most interesting piece of equipment is probably our high performance liquid chromatograph, which can separate many different biochemical compounds to help us identify and quantify them," Noland says. "However, despite the advanced technology we have at our disposal, we still do some things the old-fashioned way. For example, we still use old-fashioned mortars and pestles to grind some of our samples."

Photo: Trudy Vaittinen

Lab technologist Maara Packalen prepares to analyze black spruce proteins for a climate change project.

Biochem lab staff include technologists Maara Packalen and Lesley Rich, along with occasional short-term contract staff. Noland estimates they have performed more than 2,000 analyses over the past year.

3. Forest pathology laboratory: Identifying forest fungi

According to supervisor Glenna Halicki Hayden, the forest pathology lab is dedicated to understanding forest fungi. "Fungi play an important role in forest ecosystems, for example, by breaking down old dead trees and logs," she says. "They also cause significant timber losses every year. We help prevent losses by providing forest managers with answers and tools to help minimize the negative effects of tree diseases caused by fungi. We use a variety of techniques to identify and quantify the fungal organisms that cause disease and suggest ways to alter management practice to avoid future problems."

This lab is providing analytical support to two major projects: one that focuses on the decline of red pine in some areas of southern Ontario (see *Red Pine Mortality in Ontario* project profile at http://ofri.mnr.gov.on.ca/ofriresearch.cfm) and another that involves conducting pre- and post-harvest fungal surveys on several intensive silviculture research sites across northern Ontario (see the *Distribution, Hosts, and Site Relationships of Resident Pathogens in Northern Ontario* project profile). The second study will help resource managers make wiser decisions about where to plant various tree species to minimize disease-related timber losses, which is even more critical when costly intensive silviculture methods are used.

"To understand the role of fungi in the forest, we must first know what organisms we are dealing with," Halicki Hayden says. "The key to identifying fungi is to encourage them to develop into a form by which microscopic identification is possible. We usually do that by isolating a small piece of infected material from a branch, stem, root, or leaf into a Petri dish containing an appropriate growth medium – a mixture of agar, nutrients, fungicides, and antibiotics, the exact combination of which varies depending on the type of fungus we are looking for.

Lab supervisor Glenna Halicki Hayden processes thousands of fungi samples a year to identify tree diseases.

Photo: Trudy Vaittinen

"After the fungus has grown for several days, we culture it again in a fresh Petri dish, taking care to remove only the fungi and none of the original tree sample, to promote production of spores, called *sporulation*. Once sporulation occurs, we look at the organism under the microscope and use analytical keys to determine the genus and species. We might also use chemical tests and growth analysis to help with the identification."

She continues, "Occasionally, the fungi come to us in a form that can we can identify immediately under the microscope, for example, mould growing on seedlings. In other cases, particularly root diseases, we culture the unknown organism in pairs with known fungal species and analyze their growth compatibilities. If the two fungi in a dish are compatible, meaning they grow together and become one culture, then we know that they are the same species. We are also expanding into DNA identification of fungi, using a process called polymerase chain reaction or PCR."

While some people shrink away when they see dozens of Petri dishes containing cultured fungi in full bloom on the lab's counter, Halicki Hayden sees these samples as not just keys to unlocking new scientific information but also proof of nature's artistry. "No piece of equipment is as intriguing as the organisms we culture in the lab," she asserts. "Fungi are nature's recyclers. Without them, we'd be up to our necks in wood."

Halicki Hayden is the only permanent technologist in the lab but occasionally has short-term contract assistance. The forest health and pathology program also has a research scientist, John McLaughlin, and a research forester, Sylvia Greifenhagen, with whom Halicki Hayden works closely. She estimates that the pathology lab processes more than 20,000 culture dishes annually.

For more information about laboratory services at OFRI, contact Ravi Kanipayor (geochemical lab), (705)946-7448, ravi.kanipayor@mnr.gov.on.ca, Tom Noland (tree biochemistry lab), (705)946-7421, tom.noland@mnr.gov.on.ca, or Glenna Halicki Hayden (forest pathology lab), (705)946-7412, glenna.halickihayden@mnr.gov.on.ca.

The Forestry Research Partnership 5 years later

By Lisa J. Buse

In 2000, a four-way partnership among Tembec, the Ontario Ministry of Natural Resources (MNR), the Canadian Forest Service (CFS), and the Canadian Ecology Centre established the Forestry Research Partnership (FRP) as a result of the Ontario Forest Accord (see *Insights* Vol. 5, No. 1). Over the last five years the partnership has evolved, but its mission has remained constant: To develop and implement leading-edge forestry practices that are ecologically and economically sustainable.

"When I visit Tembec operations in northeastern Ontario, I'm beginning to see the effects of FRP projects and it makes me feel great about what we've accomplished," says FRP extension manager John Pineau. "From improved yield curves being used in planning to more sophisticated spatial modelling to better seedlings being planted as a result of realized gains trials – new information and tools from partnership projects are starting to be integrated into industry's day-to-day operations."

What are some of the FRP's major accomplishments?

According to George Bruemmer, FRP general manager, "a key factor in the success of the partnership has been that by collaborating, each of the partners gets what they need, whether it be expertise, funding, or transfer support." In addition to funding part or all of more than 130 research projects, the partnership has focused on transferring project results to resource managers through workshops, field tours, publications, and a dynamic web site (http://forestresearch.ca). In 2003 alone, the FRP hosted 13 workshops and four tours on topics as diverse as boreal forest management, silvicultural effectiveness monitoring, red pine diseases, carbon budget modelling, and the importance of stick nests for birds. This pace continued in 2004. "We hardly have to market our events anymore," Pineau says. "Clients know they will get valuable new information, and word of mouth seems to fill the available spots."

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Photo: Forestry Research Partnership

Workshops and field tours are an important part of the FRP's transfer efforts. During this tour in Algonquin Park, research scientist emeritus Harvey Anderson spoke about managing yellow birch.

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When FRP secretariat members were asked: "If you could only highlight two of the many FRP projects, which would they be?" most mentioned the following two projects (for examples of projects funded in whole or part by the FRP that are lead or supported by Forest Research and Development staff at OFRI, see sidebar on Page 9):

- **The spatial analysis project**, which assimilates results from all the other FRP projects into spatial forest-level planning (go to http://forestresearch.ca and click on *Partnership Projects - Spatial Analysis - Patchworks Landscape Modeling Tool, #120-201*).
- **The yield curve project**, which is using an up-to-date, comprehensive growth and yield database to allow more accurate predictions of both natural and managed forest growth in Ontario, for use in management planning and wood supply analyses (go to http://forestresearch.ca and click on *Partnership Projects - Fibre Production - Benchmark Yield Curves, #130-009*). These curves are being reviewed for accuracy prior to use.

The FRP has provided a forum for many of MNR's research partners (e.g., CFS, Sustainable Forest Management Network, FERIC, FORINTEK, Forest Ecosystem Science Co-operative, Forest Renewal Co-op, ULERN, other forest companies and universities) to work together towards a common goal – *the 10/10 objective* (a 10 percent increase in wood volume in 10 years). "Working towards a common goal provides for the greatest gains in science," Bell says. "What's more, having all of the partners work together helps get results incorporated into both policy and on-the-ground practices more quickly." The ultimate goal is demonstrating the success of implementing intensive forest management approaches that can then be implemented more broadly.

Tembec's chief forester for Ontario, Rick Groves, says that the direct links between researchers and operations staff have been beneficial. "We've seen increased willingness among staff to accommodate new approaches over the last five years."

Although resource managers are the main recipients of new knowledge and tools generated through the partnership, linkages with the Canadian Ecology Centre provide a broader audience with access to new information. For example, teachers are exposed to the complexities of forest management as part of an annual eastern Canada teachers tour sponsored and organized with the FRP's help. Feedback from these tours has been very positive, with teachers from as far away as Great Britain participating. "It's hands-on, interactive learning where we take them out to the forest and let them experience the complexity of resource management first hand," says Pineau, one of the key organizers. "The teachers appreciate this unique opportunity to find out more about forests and forestry." (Participant feedback is posted at http://teacherstour.canadianecology.ca/testimonials.htm.) Occasional tours and events are also organized for students and the public.

What challenges remain?

As with any initiative, the FRP has its share of challenges: getting people who are already busy involved, keeping the momentum going while juggling multiple projects, and encouraging implementation of new knowledge when information overload is the rule rather than the exception. In addition, the time lag between starting projects and seeing results can be longer than anticipated. "Industry wants to see value for investment sooner rather than later," emphasizes Al Stinson, FRP partnership specialist, "so the pressure's on to deliver tangible results."

Jim Baker, MNR's science coordinator and a member of the FRP secretariat, notes that the group continues to struggle with issues such as ensuring that the FRP is adequately funded over the long term; determining which projects are both appropriate for the FRP and a priority for all partners; and like many organizations, prioritizing what new science is essential vs. what would be nice to have. "This involves sifting through what information is available, determining how reliable it is, identifying areas of uncertainty where additional knowledge is needed, and focusing our efforts there," says Baker.

What does the future hold for the FRP?

The FRP is now moving into its sixth year. Bruemmer emphasizes that "Tembec has put forward the money and coordination for the partnership, while MNR and CFS have provided science expertise. We are looking for impacts in the field that show movement towards our 10/10 objective. As long as that's evident, Tembec will continue to support the partnership."

Following a recent tour of FRP projects, Mike Willick, then assistant deputy minister of MNR's Forests Division, now with Science and Information Resources Division, indicated that he was very enthusiastic about "the quality of the projects, the level of cooperation among agencies, and the dedication of staff doing forest science. These partnerships are important for supporting the MNR's mandate of ecological sustainability, advancing research, and most of all, getting research and science results into practice through the partners' direct involvement throughout the projects." He adds, "We will continue to support the partnership as long as it continues to meet our needs."

"Look for more projects and products, enhanced extension efforts, and possibly the involvement of new partners in the future," Pineau says. "We also hope to increase the diversity of professional development, continuing education, and training we provide to forestry workers and resource managers."

For more information about the FRP, visit http://www.forestresearch.ca.

Examples of projects funded in part by the FRP over the past 5 years that Forest Research and Development (FRDS) staff at OFRI are leading

Project	**Synthesis of tolerant hardwood research**
Objective	Assemble descriptive information about historical and ongoing hardwood research projects in Ontario and assess their potential for followup.
Initiated	2001
Status	Completed. Bibliography (OFRI Forest Research Information Paper No. 153) and metadata report (OFRI Forest Research Information Paper No. 152) produced and database available. Projects were assessed, and a list of those warranting remeasurement was generated. Database was uploaded into Ontario Research Studies Database (ORS, http://www.glfc.forestry.ca/ors).
Contact	Bill Cole, OFRI-FRDS, lead, and partners Andrée Morneault, MNR-Southern Science and Information, and Don Farintosh, MNR District Office-North Bay
More details	http://forestresearch.ca/partnership_projects/fibre_production/130-108.htm
Project	**Old trial remeasurement for intensive forest management**
Objective	Remeasure well-designed forest management studies in Ontario to quantify the effects of management practices on fibre production, tree and stand structure development, and early succession, and use the data to validate early growth models and provincial free-to-grow standards.
Initiated	2001
Status	Ongoing. Of the 32 studies identified for remeasurement, 21 have been remeasured and reported on at workshops and conferences; related summary documents are posted on the website; and journal manuscripts have been published or are in process for most of these studies.
Contact	Wayne Bell, OFRI-FRDS
More details	http://forestresearch.ca/partnership_projects/fibre_production/130-103.htm

Examples of projects funded in part by the FRP over the past 5 years and in which FRDS staff at OFRI are partners

Project	**Regeneration of Ontario boreal mixedwoods**
Objective	Develop vegetation management strategies for regenerating spruce-aspen mixedwoods to produce aspen fibre crop at 35-45 year rotations followed by high-quality spruce sawlog crop at 80 years. OFRI's role is to monitor the microclimate and ecophysiology of regenerating spruce and aspen crop.
Initiated	2003
Status	Ongoing. Project establishment report available on web site; early vegetation dynamics will be monitored and reported on at 5-year intervals.
Contact	Doug Pitt, CFS, lead; Bill Parker, OFRI-FRDS, and Scott McPherson, MNR-Northeast Science and Information, partners
More details	http://forestresearch.ca/partnership_projects/fibre_production/130-108.htm
Project	**Economic analysis of intensive forest management**
Objective	Investigate the economics of intensive forest management using two modelling approaches based on various levels of management intensity for the Romeo Malette (boreal) and Nipissing Forest (Great Lakes St. Lawrence).
Initiated	2002
Status	Completed. Results presented at workshop, and two reports produced.
Contact	Margaret Insley, University of Guelph, lead; Wayne Bell, OFRI-FRDS, partner
More details	http://forestresearch.ca/partnership_projects/sustainability/140-105.htm
Project	**Groundhog River Fluxnet Station**
Objective	Provide baseline data from a Fluxnet station established on a boreal mixedwood site near Timmins as part of network of seven stations across Canada (three are in northeastern Ontario) to monitor atmospheric CO_2 fluxes. Data will be used in models that compare fluxes in disturbed and undisturbed forests and watersheds.
Initiated	2003
Status	Ongoing. Data supports a number of projects.
Contact	Harry McCaughey, Queens University, lead; Al Cameron, Canadian Forest Service-Great Lakes Forestry Centre, and Jim McLaughlin, OFRI-FRDS, partners
More details	http://forestresearch.ca/partnership_projects/sustainability/140-108.htm

Keeping Ontario's forests "in the sink"

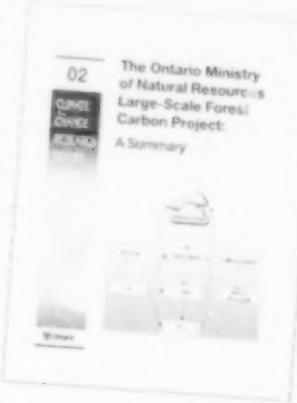
By Abigail M. Obenchain

If you want to learn more about carbon budget modelling and its role in Canada's response to climate change, check out a new MNR Climate Change Research Report entitled *The Ontario Ministry of Natural Resources Large-Scale Forest Carbon Project: A Summary*, published by MNR's Applied Research and Development Branch and available from OFRI.

"If you are interested in the ability of Ontario's forests to mitigate global climate change, then this report is one you should read," says research scientist Steve Colombo, who co-authored the report and is leading the Large-Scale Carbon Project. "It describes the steps MNR is taking to determine how much carbon is stored in our forests now and how forest management affects carbon storage."

According to the Kyoto Protocol, Canada has the option to include the amounts of carbon forests take in and release in its carbon budget accounting. In other words, we can use carbon stored in forests to counter-balance our fossil fuel emissions.

This option benefits Canada as long as our forests are carbon sinks rather than sources – in other words, our forests need to take in more carbon than they release. Staying on the sink side of the ledger can be tricky: Forest management strategies such as planting more trees and using intensive silviculture to enhance tree growth can result in more carbon being removed from the atmosphere; however, increases in tree and soil decay or burning can result in more carbon being released than taken in.



Researchers are helping forest managers and planners ensure that Ontario's forests remain sinks by providing a modelling approach that allows them to project how much carbon is being exchanged between Ontario's forests and the atmosphere and to determine how forest management activities will affect carbon exchange. Currently, researchers are evaluating three approaches to modelling forest carbon to determine which will work best for Ontario.

To obtain a copy of this report (MNR Climate Change Research Report No. CCRR-02), e-mail information.ofri@mnr.gov.on.ca or call the OFRI publication request line at (705)946-2981, ext. 271.

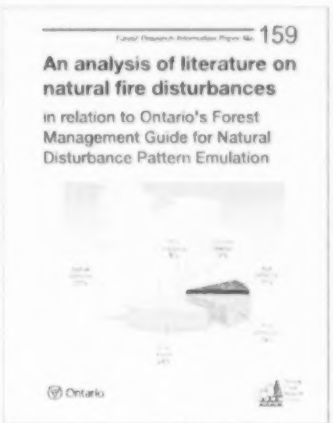
Scoping the science related to Natural Disturbance Pattern Emulation Guide directions

By Abigail M. Obenchain

How well does current scientific knowledge of forest fire disturbances support the directions of Ontario's *Forest Management Guide for Natural Disturbance Pattern Emulation* or NDPE Guide, which strives to help resource managers harvest the forest in a more natural way?

Ajith Perera, Lisa Buse, and Rob Routledge, researchers with Forest Research and Development Section at OFRI, present their investigation of this question in a report entitled *An Analysis of Literature on Natural Fire Disturbances in Relation to Ontario's Forest Management Guide for Natural Disturbance Pattern Emulation.*

"Our main finding was that the scientific knowledge of natural fire disturbances, in relation to the directions in the NDPE Guide, has significant gaps," Perera says. "We found more than a thousand science publications related to natural fire disturbances in North America, but only 48 contained experimental evidence relevant to the NDPE Guide's directions for landscape harvest size patterns, landscape harvest patch separation, residual stands, and residual trees and downed woody debris in Ontario."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An analysis of literature on natural fire disturbances
in relation to Ontario's Forest Management Guide for Natural Disturbance Pattern Emulation
Ontario

While some studies do support the NDPE guide's directions, the report indicates that much more research is needed, especially to understand:

- The variability associated with size-class distribution of burned patches (little is known about the likelihood of different patch sizes)
- Spacing and separation patterns of burned patches (this topic is virtually unstudied)
- Peninsular residual forest patches (these patches of unburned trees protrude into a burned area in a peninsular shape; they are much less studied than insular patches – islands of trees within burned areas – because they are difficult to define)
- Variability of post-fire residual tree densities (most studies that looked at trees left behind after fire had data from only one fire event, making the results difficult to generalize)

Continued on Page 11

Continued from Page 10

"This new report is very helpful to Ministry of Natural Resources policy developers and scientists as they continue to provide North American leadership in this aspect of sustainable forest management," says Joe Churcher, silviculture systems specialist with MNR's Forest Management Branch in Sault Ste. Marie. "For policy developers, the report identifies which aspects of our current guidance should be reconsidered in light of recent literature, which is very timely as we develop a new landscape-level guide to forest management. For scientists, it clearly indicates what areas require further study."

The report was completed as the first step in implementing the action plan for scientific studies to assess the effectiveness of the NDPE guide's direction (see http://ontariosforests.mnr.gov.on.ca for the action plan). The action plan was mandated by the Forest Class Environmental Assessment (EA) Declaration Order (for more on EA, visit http://ontariosforests.mnr.gov.on.ca).

To obtain a copy of the OFRI report (OFRI Forest Research Information Paper No. 159), call the OFRI request line at (705)946-2981, ext. 271, or e-mail information.ofri@mnr.gov.on.ca.

What do Canada yew, red pine mortality, carbon sink and source functions, and black spruce protein markers all have in common?

Each of these is the subject of a brand-new project profile, housed on the *Research* page of OFRI's Internet site. You'll find this page at http://ofri.mnr.gov.on.ca/ofriresearch.cfm.

This page also contains profiles of more than 20 other forest research projects, the subjects of which range from modelling natural disturbance regimes to enhancing forest productivity to breeding blister rust-resistant white pine.

For more information about OFRI's website, contact Abby Obenchain, abigail.obenchain@mnr.gov.on.ca.

New book tells all about emulating natural forest landscape disturbances

By Abigail M. Obenchain

A new book entitled *Emulating Natural Forest Landscape Disturbances: Concepts and Applications* provides the first-ever synthesis of a very "hot" – and very complex – forest management topic.

Co-edited by two staff with Forest Research and Development Section at OFRI, research scientist Ajith Perera and technology transfer coordinator Lisa Buse, this 315-page book addresses a range of questions stemming from the discussion about emulating natural forest disturbances, such as:

- What does emulating natural disturbance mean?
- What is the ecological and genetic basis for emulating natural disturbance?
- How have computer models been used to understand natural disturbance dynamics to support emulation?
- What are the consequences of emulating natural disturbance for forest industry?
- What challenges do policymakers and practitioners face in trying to ensure that forest management emulates natural disturbance?
- What is the state of current scientific knowledge about emulating natural disturbance, and where are the information gaps?

"This book does a terrific job of capturing the current thinking and knowledge about emulating natural forest disturbances across northern North America," says Brian Hillier, manager, MNR's Forest Policy Section. "It will be a very helpful resource for MNR's ongoing efforts to develop and improve policy direction based on natural disturbance emulation. We believe that modifying forest management practises to emulate natural disturbances is the right thing to do; however, there is much debate on what this means and how to make it happen efficiently and effectively on the ground. With this book, we have some clarity on what we know and what we still need to learn."

"This book does a terrific job of capturing the current thinking and knowledge about emulating natural forest disturbances across northern North America."

Michael Gluck, an MNR ecology forester who is developing MNR's new landscape guide to forest management, says, "I found the book a good balance of concepts, research, and policy. The concepts section does a good job of reminding us of the limitations of this new management paradigm and helps keep policymakers focused on the ecological goals of management. The policy section is rich in a range of perspectives and experience on this changing way of thinking about forest management."

"It captures the current thinking and knowledge on this topic and firmly places Ontario at the forefront of this aspect of forest management," says MNR silviculture systems specialist Joe Churcher. "Ontario's status in this regard was reinforced through a number of posters presented at the World Forestry Congress in 2003, where participants from across Canada and around the world commented that Ontario was the first place that they had seen the emulation of natural disturbances included as part of regular forest management practices. The number and stature of the people – both authors and reviewers – involved in this book is impressive and speaks to the international respect that Ontario has achieved in being at the leading edge of sustainable forest management."

If you'd like to purchase a copy of this book, visit a major online bookseller.

Everything you ever wanted to know about vegetation management alternatives but were afraid to ask

By Abigail M. Obenchain

Want to know more about forest vegetation management and alternatives to herbicides? Then check out *Vegetation Management Alternatives: A Guide to Opportunities*, a recently released binder that contains 14 technical notes on topics such as:

- What are the current approaches to vegetation management?
- What role does vegetation management play in various silviculture systems?
- How do various harvesting methods affect vegetation management?
- How does vegetation management link to forest renewal?

"This guide will be a very helpful resource for anyone who is involved in forest management, especially those who may not have exposure to innovative, integrated vegetation management strategies," says Wayne Bell, a research scientist with Forest Research and Development Section at OFRI and lead compiler of the binder. "Much of the information is drawn from scientific work conducted over the last decade as part of the Ontario Ministry of Natural Resources' Vegetation Management Alternatives Program, and the notes were designed to be at a level that a recent forestry graduate can understand."

"It's a useful tool to help people think about and understand the link between vegetation management and forest management in general," says Bill Towill, coordinator, MNR Northwest Science and Information, also a partner in this project. "It would be very useful as a quick reference for answering questions from clients and the public."

MNR's Northeast Science and Information was also a partner in the binder project. To obtain a copy of the Vegetation Management Alternatives binder, call the OFRI publication request line at (705)946-2981, ext. 271 or e-mail information.ofri@mnr.gov.on.ca.

Research, science, and policy staff convene in the Sault for *Science Matters II*

By Abigail M. Obenchain

On November 24, 2004, 90 Ministry of Natural Resources (MNR) research, science, and policy staff came together in Sault Ste. Marie for the second annual *Science Matters* session, during which they learned more about each other's projects and brainstormed ways to continue improving how forest research and science are infused into management planning and practice.

"This year's session went well and included a diversity of presentations by forest researchers, science staff, and policy folks, as well as a discussion session," reports Fraser Dunn, MNR's Applied Research and Development Branch director. "We will continue to explore ways to refine and improve *Science Matters*. These sessons are important because they provide a formal opportunity for improving integration between science and policy and because they spawn informal interactions that are vital to ensuring that science supports MNR's policy and planning priorities."

Wayne Fiset, manager of Forest Research and Development Section (FRDS), agrees. "The real value of Science Matters is that it is a catalyst for creating discussions and collaboration among participants after the sessions. Through working together to ensure that policy and planning are built on a strong scientific foundation, we can contribute more effectively to the mission of ecological sustainability and to the goals set out in *Our Sustainable Future*."

Bill Thornton, MNR's acting assistant deputy minister for Forests Division, adds, "In our business, good science leads to good policy. It's what our stakeholders expect and what we need to deliver."

According to the evaluations from this session, nearly all participants felt that *Science Matters* is worthwhile and should continue. Participants provided many suggestions for improving the event, particularly reducing the number of presentations and increasing the time for focused discussions, as well as re-examining and perhaps tightening the event's focus to specific issues or themes.

Lisa Buse, FRDS technology transfer coordinator and a *Science Matters* organizer, reports that improvements made since the 2003 session include integrating policy and science staff on Forest Class Environmental Assessment teams; having a forest policy person sit on the MNR science coordinators forum; involving research staff in regional forestry forums, forester intern training modules, and local citizens committee meetings; and having MNR Forests Division staff in the Sault receive and contribute to OFRI's biweekly staff e-newsletter.

World leaders in forest management to gather in Thunder Bay

By Abigail M. Obenchain

If you are involved or interested in management of Ontario's forests, mark July 26-28, 2005 on your calendar. On these dates, the Forest Renewal Co-op and the Ontario Ministry of Natural Resources will host *The Thin Green Line* in Thunder Bay. This symposium will feature world leaders in forest management, who will speak about topics such as:

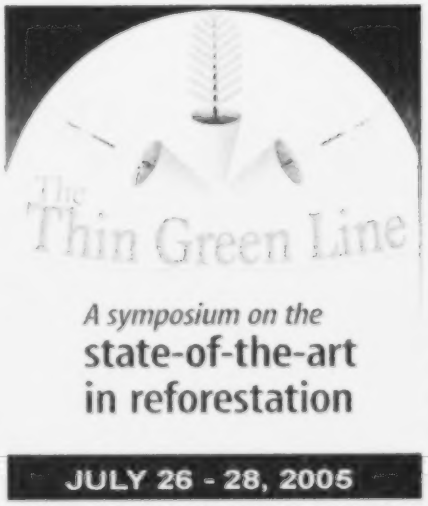
- Enhancement of timber production and non-timber values through stand establishment
- Status of reforestation and afforestation around the world
- Nursery methods to produce target seedlings
- Planting and planting site treatments to optimize regeneration

Steve Colombo, a research scientist with Forest Research and Development Section at OFRI and cochair of the symposium, points out that prompt and efficient regeneration of forests to enhance wood availability and sustainable forest management is important economically and ecologically for both company and government foresters.

"To maintain a continuous and sustainable supply of wood without affecting other values, forests must be regenerated promptly to the required species," he says. "And while there's a lot of excellent information about enhanced forest management, particularly concerning forest regeneration, it can be a challenge to ensure that the right people are getting the information. This symposium will provide an excellent opportunity for those who are involved in forest regeneration to hear about the latest advances in research, methods, and practices."

The Thin Green Line will bring together leaders in the practice and science of forest management for two days of presentations, as well as a full day of field and nursery tours to see examples of present and past forestry practices in northwestern Ontario. The symposium will feature invited speakers from Canada, the United States and Europe, including:

- Dr. Lorenzo Ciccarese, Nature Conservation Department, Italy's Agency for Environmental Protection and Technical Services (APAT), Rome
- Dr. Philip Comeau, associate professor, Department of Renewable Resources, University of Alberta; chair, Western Boreal Growth and Yield Association; and principle researcher in silviculture and stand dynamics, Centre for Enhanced Forest Management, Edmonton, AB
- Dr. Kas Dumroese, national nursery specialist, USDA Forest Service, and editor-in-chief, *Native Plants Journal*, Moscow, ID
- John Kitchen, president/CEO of Pacific Regeneration Technologies (PRT), Inc., Vancouver, BC
- Dr. Anders Mattsson, associate professor, Department of Mathematics, Natural Science, and Technology, Dalarna University, and chair, International Union of Forest Research Organizations (IUFRO) Nursery Operations Working Group, Dalarna, Sweden
- Dr. Robert Wagner, Henry W. Saunders distinguished professor in forestry, University of Maine, and director, Cooperative Forestry Research Unit of the Technological Cooperative, Orono, ME
- Dirk Brinkman, CEO, Brinkman & Associates Reforestation Ltd., New Westminster, BC



Topics of invited presentations include:

- *What North Americans Can Learn From Scandinavian Regeneration Practices*
- *Overcoming Challenges in North America's Forest Tree Seedling Industry*
- *Successful Stock Production for Forest Regeneration: What Foresters Should Ask Nursery Managers About Their Crops*
- *Control of Competing Vegetation to Maximize the Establishment and Productivity of Forests*
- *Plant Interactions and Stand Dynamics: How Should We Use Them to Achieve Successful Natural Regeneration and Promote Alternative Forest Products*
- *Challenges and Successes in Afforestation and Reforestation in Southern Europe*
- *Forest Regeneration in 2055: What Can We Expect in the Next 50 Years?*
- *Regeneration for Ecosystem-Based Sustainability in Canada*

To register for the symposium or to present a paper, visit http://www.forestrenewal.ca/thingreenline.

Other MNR staff involved in this symposium include Shelagh Duckett, regional forest health and silviculture specialist, Forest Health and Silviculture Section, and Thom McDonough, stand establishment specialist, Forest Health and Silviculture Section, both of whom are serving on the Program Committee.

OFRI STAFF NEWS

In September 2004, **Wayne Fiset** took the Forest Research and Development helm at OFRI. "Seventeen years ago I started my career with MNR as a fisheries research technician in Maple, Ontario, so I feel like I am coming full circle," Fiset says. "I am really happy to be back into research, particularly working with Forest Research and Development Section staff at OFRI, who are really top notch. I am currently developing a strategic plan for the section to identify how our current research activities support *Our Sustainable Future*, MNR's new strategic direction document, and MNR's new Science Strategy, particularly with regard to increasing research input into forest policy and to developing and enhancing partnerships with other parts of MNR and other natural resource organizations. Our plan will also identify where we should be headed in the future, again to help ensure MNR's strategic goals are met."

Fiset's previous positions include MNR district manager in Chapleau; information management supervisor with the Sault Ste. Marie district office; senior wildlife biologist with MNR's Northeast Region in Timmins; aquatic ecologist, also in Timmins; district biologist in Gogama; senior fish and wildlife technician in Blind River; and, of course, fisheries technician in Maple. He says one of the highlights of his career was being involved in the background research for and reintroduction of Atlantic salmon into the Credit River and Wilmot Creek in southern Ontario. Fiset has an Honours B.S. in fisheries biology from the University of Guelph. For the last three years, he has been a member of the International Association of Facilitators.

Wayne Fiset, new FRDS manager (left), chats with Mike Willick, assistant deputy minister, MNR's Science and Information Resources Division.

We are pleased to announce the hiring of two research scientists:

- **Dr. Mahadev Sharma** is the new growth and productivity research scientist. Sharma holds a Ph.D. and an M.Sc. in forest biometrics and an M.Sc. in statistics, all from Virginia Polytechnic Institute and State University. He also has an M.Sc. in Physics from Tribhuvan University in Kathmandu, Nepal. Previously, he worked as a research scientist in forest biometrics at FORINTEK in Sainte-Foy, Quebec. At OFRI, he will be delivering a comprehensive forest growth and yield research program for Ontario.

Mahadev Sharma

- **Dr. Rongzhou Man** is the new boreal mixedwood research scientist. Man has an extensive research and project management background in boreal mixedwood silviculture. He has conducted research programs for the Alberta Research Council, the University of Alberta, and the Jilin Forestry College in China. He received his Ph.D. in silviculture and ecophysiology from the University of Alberta. Most recently, he was research coordinator for the Mixedwood Management Association (MWMA), Department of Renewable Resources, at the University of Alberta. At OFRI, he will be delivering a comprehensive boreal mixedwood research program for Ontario.

Rongzhou Man

Both scientists say they are looking forward to working with their new colleagues at OFRI and with many partners – both inside and outside of MNR – to develop and deliver new knowledge and tools to support the goals laid out in *Our Sustainable Future*, MNR's new strategy document.

Research scientist moves to Thunder Bay ...

Environmental stress research scientist **Steve Colombo** has relocated to MNR's Centre for Northern Forest Ecosystem Research (CNFER) at Lakehead University in Thunder Bay. He is still part of the Forest Research and Development Section, and his e-mail address remains steve.colombo@mnr.gov.on.ca. His new phone number is (807)343-4020.

Steve Colombo

OFRI welcomes two other new staff:

- Tree improvement data analyst **Francis Tang** has an M.Sc. in statistics from the University of Saskatchewan in Saskatoon. While earning his master's degree, he worked part time as a data analyst for the Representative Board of Saskatchewan Pharmacists (RBSP) and a private consulting company. He also earned a B.S. in computer engineering in Beijing, China. He says he is very excited to be working at OFRI and is especially impressed with OFRI's greenhouses and other growth facilities.

Francis Tang

- Forest regeneration senior research technician **Mark Crofts** brings a diversity of experience to this position; in previous lives he worked for the Canadian Forest Service on the Canadian National Vegetation Classification Project, for MNR's fire science unit on implications of climate change on fire management in Ontario, for Sault College as an instructor in the Natural Resources Program, and for Pukaskwa National Park as a fire and vegetation management specialist. He has a forest technician diploma from Fleming College, a B.A. from Trent University and a B.Ed. from Laurentian University.

Mark Crofts

OFRI bids farewell to ...

- **David DeYoe,** the former manager of Forest Research and Development Section at OFRI, who is now a senior advisor for bioproducts/biotechnology with MNR's Industry Relations Branch. Employed by MNR since 1988, David's first management position was with MNR's Applied Science and Technology (ASAT) unit, which in 1992 was divided up and assimilated into OFRI and MNR's Forest Management Branch. He also served as provincial coordinator of the technology development units (now known as science and information units) for two years. In 1992, he came to OFRI and spent the better part of 12 years as manager of the Forest Research and Development Section, with a one-year sabbatical as knowledge exchange and technology exploitation coordinator for the Sustainable Forest Management Network. David says it is difficult to choose just a few highlights in his career, but provides these:

David DeYoe

-The people, particularly the "unsung heroes" such as administrative, operations, technical, and technology transfer staff. About the research staff at OFRI, he says: "They are all unique, all smart, each contributing in his/her own way to the science they practice, and each exceptionally talented."

-OFRI's resourceful response to downsizing in the mid-1990s. "Recovering from downsizing defined the integrity and quality of those that remained. It was a significant challenge, but we enhanced our productivity and adjusted well to a new way of doing science business in MNR. Looking back today, it is amazing what has been accomplished through creative and complex partnerships and an increasingly strong alignment with policy specialists and forest practitioners. OFRI is an exceptional research and development organization, one that produces and delivers in a way that facilitates adoption and use of information and tools."

-The OFRI building, which was just two years old when he moved into it. "This facility is the best I've ever seen in combining utility, functionality, and beauty."

David's current work is focused on investigating use of forest biomass for energy, particularly in light of increasing concerns about how fossil fuels may become depleted and may be contributing to climate change, and for other value-added bioproducts such as chemicals and polymers.

His parting thought to staff and forest research partners and clients: "Research is always moving forward. Each day brings advancement in awareness or understanding, however small. It may not be clear whether the advancement is significant at the time, but it usually is, if you recognize its meaning within the context of the broader system. I feel privileged to have been a part of that process at OFRI for so many years."

- Research scientist **Chris Papadopol** retired on September 30, 2004, after more than 22 years of dedicated service to MNR. Chris first started his forestry career as a research scientist in Romania. After moving to Canada in 1981, Chris joined MNR's Ontario Tree Improvement and Forest Biomass Institute (OTIFBI), then located in Maple, Ontario, as a research scientist. In 1991, Chris and others from OTIFBI relocated to the new OFRI building, where he continued his research work in intensive silviculture and climate change. With no immediate plans on the horizon, Chris is looking forward to spending more time with his family.

Chris Papadopol

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OFRI STAFF NEWS Continued from Page 15

- After more than 27 years of dedicated service, **Denzil Irving** retired on September 30, 2004. Denzil came to MNR in 1977, working as a resource technician at MNR's research facility in Maple, Ontario. In 1991, he and others from Maple moved to the new OFRI facility in Sault Ste. Marie; with that move, he took on a new role as a senior research technician in the Stock Production and Renewal Program. In 2000, he was promoted and began providing senior technical coordination and leadership to a variety of forest research programs within the institute. Denzil says, "I have enjoyed my career with the Ministry of Natural Resources and have worked with some interesting characters over the years. It's all been a very good experience, one that I will never forget." He says he plans to remain active – playing hockey a few times a week and spending more time with his family and friends enjoying the outdoors.

Denzil Irving

Upcoming events

June 14-18, 2005:

Temperate Wetland Restoration Training Course, Alliston, ON. This course examines methods of restoring wetland function in both agricultural and urbanized settings. A registration fee subsidy is available for a limited number of MNR field staff. Contact: Angus Norman, (519)873-4623, angus.norman@mnr.gov.on.ca, for details on subsidies.

July 26-28, 2005:

The Thin Green Line: A Symposium on the State of the Art in Reforestation, Thunder Bay, ON. Sponsored by the Forest Renewal Co-op and the Ontario Ministry of Natural Resources. http://www.forestrenewal.ca/thingreenline.

Q. Do forests help counteract climate change?

A. Environmental stress research scientist Steve Colombo answers: Trees and other plants remove carbon dioxide, the most common greenhouse gas, from the atmosphere, because they need carbon to live and grow. Forests store carbon in the trees, the dead wood on the forest floor, and the soil, while slowly cycling it back into the atmosphere through the carbon cycle. Forest that are removing more carbon than they are releasing are *carbon sinks*.

As part of the natural forest carbon cycle, carbon is released when trees die and decay. A disturbance such as a forest fire causes a forest to become a *carbon source* for a period of time, because the dead trees from the old stand initially release more carbon than the vigorous new forest replacing it. Eventually, the high growth rate of the new forest makes it a carbon sink once again. Overall, forests are composed of vigorous middle-aged stands that are sequestering (removing and storing) lots of carbon dioxide from the atmosphere, slow-growing old stands that hold lots of carbon but don't sequester much, and regenerating stands that hold less carbon but are gradually increasing their sequestration rates.

Researchers are studying Canada's forests to understand this important carbon sink. Having large areas of healthy forests helps slow climate change. One way to maintain our forests as sinks is to plant more trees, for example, in areas where farming has been unsuccessful due to poor soils.

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Have a suggestion?

Want more information on a research project?

We want to hear from you!

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